NTRC NANOTECHNOLOGY RESEARCH CENTER

Controlling Health Hazards When Working with Nanomaterials: Questions to Ask Before You Start

Here are some questions you should ask yourself before starting work with nanomaterials.

Here are some options you can use to reduce exposures to nanomaterials in the workplace. These options correspond with the questions on the left.

(1) FORM

Have you done a job hazard analysis? What is the physical form of the nanomaterial? How much are you using? Can you reduce exposure to the nanomaterial by changing its form (for example, putting powder into a solution) or reducing the amount you are using?

DRY POWDER
(typically highest potential for exposure)

SUSPENDED IN LIQUID

PHYSICALLY BOUND/ ENCAPSULATED
(typically lowest potential for exposure)

(2) WORK ACTIVITY

How are you using the nanomaterial? Could the work activity cause exposure? Is the likelihood of exposure low or high? Can you change the way you do the activity to reduce the exposure?

Applies to Dry Powder Nanomaterials

- Higher potential for exposure: Dumping bags of powder, bagging or sieving of products
- Lower potential for exposure: Scooping/weighing of product, transporting containers with light surface contamination or closed barrels/bottles/bags

Applies to Nanomaterial Suspended in Liquids

- Higher potential for exposure: Spraying, open top sonication, producing a mist
- Lower potential for exposure: Cleaning up a spill, pipetting small amounts, brushing

Applies to Physically Bound/Encapsulated Nanomaterial

- Higher potential for exposure: Cutting, grinding, sanding, drilling, abrasive blasting, thermal release
- Lower potential for exposure: Manual cutting and sanding, painting with a roller or brush

(3) ENGINEERING CONTROLS

Based on the form and the work activity, what engineering controls will be effective? What are the key design and operational requirements for the control? How does the non-nanomaterial base material or liquid affect exposure?

Applies to Dry Powder Nanomaterials

- Chemical fume hood
- Glove box
- Nanomaterial handling enclosure
- Ventilated bagging or dumping stations
- High-efficiency particulate air (HEPA)-filtered local exhaust ventilation

Applies to Nanomaterial Suspended in Liquids

- Chemical fume hood
- Glove box
- Nanomaterial handling enclosure
- Local exhaust ventilation
- Ventilated spray booth

Applies to Physically Bound/Encapsulated Nanomaterial

- Chemical fume hood
- Glove box
- Local exhaust ventilation
- Downdraft table
- Wet cutting/machining
- Ventilated tool shroud
- Blasting cabinet

(4) ADMINISTRATIVE CONTROLS

Have you considered the role of administrative controls? Have you set up a plan for waste management? Have you considered what to do in case of a spill or how you will maintain equipment?

Applies to All Nanomaterial Forms

- Establish a chemical hygiene plan
- Perform routine housekeeping
- Train workers
- Use signs and labels
- Restrict access to areas where nanomaterials are used
- Handle and dispose of all waste materials (including cleaning materials/gloves) in compliance with all applicable federal, state, and local regulations
- Use sealed/closed bags or containers, and secondary containment
- Label containers, such as "contains nanoscale titanium dioxide"
- Wet wipe or use a HEPA-filtered vacuum
- Do not dry sweep or use compressed air
- Incorporate nanomaterial safety into existing programs such as hazard communication

(5) PERSONAL PROTECTIVE EQUIPMENT

If the measures above do not effectively control the hazard, what personal protective equipment can be used? Have you considered personal protective equipment for the non-nanomaterial base material or liquid?

Applies to All Nanomaterial Forms

- Nitrile or chemical resistant gloves
- Lab coat or coveralls
- Safety glasses, goggles, or face shield
- Respiratory protection when indicated and engineering controls cannot control exposures, and in accordance with federal regulations (29 CFR 1910.134)
- NIOSH guidance on respirators can be found at www.cdc.gov/niosh/topics/respirators/
- Use personal protective equipment during spill cleanups and equipment maintenance

CDC NIOSH Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Are you interested in learning more about how you can safely work with nanomaterials or want to stay up-to-date on nanotechnology safety? See the NIOSH NTRC website for more information and links to guidance documents: www.cdc.gov/niosh/topics/nanotech/

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